

US-CL-CURRENT: 313/504,313/509 ,313/510

US-PAT-NO: 6320311

DOCUMENT-IDENTIFIER: US 6320311 B1

TITLE: Organic EL device having a hole injecting electrode including a

transparent electrode and a metal electrode

DATE-ISSUED: November 20, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE
Nakaya; Kenji	Ibaraki	N/A	N/A
JPX			
Codama; Mitsufumi	Ibaraki	N/A	N/A
JPX			

US-CL-CURRENT: 313/506,313/504 ,313/509 ,313/510

ABSTRACT:

An organic EL device comprises a hole injecting electrode, an electron injecting electrode, and at least one organic layer located between both the electrodes. The hole injecting electrode comprises a transparent electrode at a light emitting area, and a metal electrode located at a portion other than the light emitting area and having a sheet resistance of 1 .OMEGA./quadrature. or lower.

8 Claims, 15 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 8

DEPR:

For the material that forms a film form of electron injecting electrode, it is preferable to use a material effective for injection of electrons and having a low work function, e.g., any one of metal elements K, Li, Na, Mg, La, Ce, Ca, Sr, Ba, Al, Ag, In, Sn, Zn, Zr, Cs, Er, Eu, Ga, Hf, Nd, Rb, Sc, Sm, Ta, Y, and Yb, or compounds such as BaO, BaS, CaO, HfC, LbB.sub.6, MgO, MoC, NbC, PbS, SrO, TaC, ThC, ThO.sub.2, ThS, TiC, TiN, UC, UN, UO.sub.2, W.sub.2 C, Y.sub.2 O.sub.3, ZrC, ZrN, and ZrO.sub.2. To improve the stability of the electrode, it is also preferable to use binary or ternary alloy systems

containing metal elements. Preferred alloy systems, for instance, are aluminum alloy systems such as Al.Ca (Ca: 5 to 20 at %), Al.In (In: 1 to 10 at %), Al.Li (0.1 at % to 20 at %), and Al.R where R stands for a rare earth element including Y, and Sc, and In.Mg systems (Mg: 50 to 80 at %). Particular preference is given to pure Al, and aluminum alloy systems such as Al.Li (0.4 at % to 6.5 at % or 6.5 at % to 14 at %), and Al.R (R: 0.1 to 25 at %, especially 0.5 to 20 at %) because they are unlikely to produce compression stress. Thus, such electron injecting electrode-forming metals or alloys are usually employed as sputtering targets. These metals or alloys have a work function of 4.5 eV or lower. In the practice of the invention, it is particularly preferable to use metals or alloys having a work function of 4.0 eV or lower.